HAMATEUR CHATTER

The Milwaukee Radio Amateurs Club

June 2009, Volume 17, Issue 6

Wieich es sehe

(what I think) by KC9CMT

The summer for the Amateur Radio community in southeastern Wisconsin really starts with the Cedarburg Swapfest every year on the first Saturday in May. Some may say that it starts with the excellent Swapfest in at the Jefferson County Fairgrounds in March, but the feeling of spring and the coming summer is still not in the air at that time. I had the opportunity to attend this years event and thought that it was well worth the hour ride to get out there. A very well organized and executed event. Still, it was cold and there still was the threat of snow in the coming that day. The FM simplex contest was completed two months prior and the next event on the horizon was the AES Superfest. Our club manned a very attractive table this year at the event right next to our cross town rivals the MRC91 gang. I requested Dave WB9BWP to keep an close eye on them, but no shaniganes were reported.

The May 8th Cedarburg swapfest was as usual a very well put together and run event, that prompted me to purchase some much needed high breakdown voltage electrolytic capacitors for some of the projects with Tube type units on my list of projects. These electrolytic caps are getting harder and harder to find.

The AES Superfest at the beginning of April this year was quite a lot of fun. I decided to purchase a VX-8R this year as a gift to myself for another year of not smoking. Hey… I know the funds are in my budget somewhere, even if I do not know exactly where. So, every year I have funds for a new radio product and the wife can not come up with a rational objection.

Our club election was before the annual auction at our last membership meeting. I have to admit that I was a bit uneasy about my first experience of being elected to any type of office. To quote one of my favorite comedians of the past, "I am certainly leery of joining any club that would have me as a member." Can anyone guess who originated that joke? If you can I will buy you a soda at field day. Perhaps the wording is not completely the same, but the idea is the same.

June 27th at 8 am is the time we set aside for preparations and setup of our clubs field day area. I hope to see you all there, even if most of us just intend to supervise. Its not how much gets done, its who you get to do it. June 27th at 1pm is when field day actually starts. We are planning on running our stations until 1 pm on Sunday when the big show is officially brought to an end. We expect to pile up the points with contacts with other field day sites and perhaps even six meters will be open for the enjoyment of all. I especially enjoy working the "magic band". Today is the 12th of June and six meters is open to the south-southeast. Hope for a warm day!

As for my purchase of the VX-8R at Superfest. I am not totally happy with the performance of this particular HT. I had to buy a special high amp hour battery to run the GPS unit; then when the battery gets down to three bars on the charge scale the entire radio stops working until you recharge the system. The battery that comes with the HT will not work with the GPS unit. What a bummer! I bought a VX-6 at Superfest in 2007, which I like very much and use every day. For right now, I believe I will stay with that model along with the Icom IC-31 & IC-32W that I have as extras. When I purchased the VX-8, I did that with the thought that the D-STAR protocol that ICOM is behind will not be very popular until the manufacturer brings down the price. A thousand dollars for a HT is a bit hard to swallow right now. I only know of a few people that have one. I think the vote is still out on that type of technology. The Kids with their texting phones may find it attractive though.

I was a little late getting my field day order into our chairman of the event, Mark AB9CD, so I went to the ARRL web site and ordered a t-shirt and hat to go along with the pin that I did procure from Mark. I must admit that I am looking forward to field day this year with great anticipation. This will be my first trip to the pioneer village site. I think it will be a good time, even if I am unable to stay for the entire day. I particularly enjoy working the GOTA station. There usually are walk-in visitors at the station that can have some fun on the air. A great way to advertise our hobby to the general public.

See you There!

MRAC Officers:

Terms Expiring in 2010

- President – Mark, AB9CD
- V-President-Brian, K9LCQ
- Secretary – Vacant
- Treasurer – Vacant
- Director – Dave,WB9BWP
- Director – Dave,KA9WXN

Terms Expiring in 2011

- Director – Al, KC9IJJ
- Director – Howard, AB9FH
- Director – Mike, KC9CMT

The Club Phone Number is: (414) 332-MRAC or

(414) 332- 6 7 2 2

Visit our website at:

www.w9rh.org

Mail correspondence to:

M. R. A. C.

P.O. Box 070695

Milwaukee, WI 53207-0695

Board Meeting Minutes

By Sarah KB9ZNC

MRAC Board of Directors' Meeting Minutes May 18th, 2009

PRESENT: Brian White K9LCQ, Sarah Parks KB9ZNC, Mike Harris KC9CMT, Dave DeFebo WB9BWP, Dave Shank KA9WXN, Al Maahs KC9IJJ

Old Business

6:35 PM Brian K9LCQ read the minutes of the previous meeting. Dave KA9WXN moved to approve and Mike KC9CMT seconded. There was no treasurer's report, as it was too early for the bank statement. Brian K9LCQ read an e-mail from Mark AB9CD, covering his action items/thoughts; including updates on the repeater, Field Day, and the RAIN report. He (Mark AB9CD) continues to work on the insurance matter, and the church donation letter has been sent.

Mike KC9CMT gave an update on the election. Every office open for election has someone running for it.

Regarding Christmas party plans, Al KC9IJJ has not yet contacted the South Milwaukee club to see if they would be interested in sharing a party. He and Dave KA9WXN will continue to work on preparations for it.

Several suggestions were brought up regarding increasing membership. Suggestions included a presence and/or table at hamfests, mailing information to new hams in the area, having good presentations, announcements about club meetings on the repeater and public service nets, and contests.

New Business

Brian K9LCQ gave himself the action item of looking into the Friendship Award. He also said he would see that information regarding Field Day will be posted on the website.

There was some concern that the 'Chatter is being mailed and e-mailed to people. Howard AB9FH being the last person in charge of e-mailing it, an action item was set to see that he was still doing it.

The June program will be on the SDR kit. Poncho KA9OFA will be encouraged to have it ready by then.

Brian K9LCQ called for a motion to adjourn. Al KC9IJJ moved and Mike KC9CMT seconded. The motion passed. 7:14 PM

General Meeting Minutes

By Mark Tellier, AB9CD

Meeting called to order at 7:12 PM by VP Brian White (K9LCQ).

Secretary was absent. Minutes taken by Mark Tellier (AB9CD).

Minutes from last membership meeting read from the Chatter by Poncho KA9OFA. Hal KB9OZN motioned to accept minutes as read. Seconded by Verne W9RYA.

Treasurer report read by Mark AB9CD. Motion to accept the report by Joe N9UX. Seconded by Hal KB9OZN.

Repeater report by Mark AB9CD indicated no known issues with repeater operation.

Introductions were made (there was no sound system and therefore no microphone to pass).

Brian K9LCQ mentioned Jim Clark, W9JWN, (old call N9IDH) is SK. He passed on Tuesday (May 26th). It was mentioned he was a violinist with the MSO and participated in WX spotting at Sullivan. His family is looking for assistance with disposing of his radio equipment that is a part of the estate. If anyone can help please contact Brian White, K9LCQ or any board member.

Our election chairman, Michael Harris, KC9CMT informed the assembly of the election to be held this evening. There are three open director positions and a special election for president. The nominees for director are Al Maahs (KC9IJJ), Howard Parks (AB9FH) and Michael Harris (KC9CMT). The nominee for president is Mark Tellier (AB9CD). No new nominations were accepted and nominations were closed. With only one person per position, the election was help by a show of hands. The vote was unanimous.

Buzz talk included comments by Jerry K9FI about opening on 6M, 40M to Europe and more. K9IZV mentioned he is mentoring KC9KIQ in preparation for taking a test at the VE session on Saturday.

FD plans were briefly discussed by Mark AB9CD.

There is a free hamfest on Saturday in Racine at Hwy 20 being held by the Racine ARES group (6262 W. Washington Ave.)

SMARC will hold it's annual hamfest on July 11th in Oak Creek. See the SMARC website for more information.

A motion to adjourn for a 10 minute break before starting the annual May auction was seconded and passed unanimously.

Mark Tellier, AB9CD

Field Day On June 27th & 28th

ARRL FIELD DAY TIPS AND TECHNIQUES THAT EVERY-ONE CAN USE

Many amateurs treat ARRL Field Day (June 27-28) as a contest, even though it isn't one <http://www.arrl.org/fieldday>. But if your idea of Field Day fun is to go for the highest score possible, ARRL Contest Branch Manager Sean Kutzko, KX9X, offered the following suggestions at the ARRL Field Day Forum at the 2009 Dayton Hamvention.

1) You will get many more stations in your log by calling CQ than by tuning the dial and answering CQs; however, if you're calling CQ and not getting any replies, keep calling. Most major contesters call CQ for several minutes at a time before giving up. Giving up after three or four CQs is giving up too soon.

2) Keep your CQs short and to the point: "CQ Field Day, CQ Field Day, Whiskey-One-Alfa-Whiskey, Field Day." Wait about 5 seconds between CQs -- this gives stations enough time to answer you.

3) Use standard phonetics. "Cute" phonetics don't always get through and they can confuse newer operators.

4) When working a station, you should give your exchange information only once and keep it simple. "Whiskey-One-Alfa-Whiskey, copy three Foxtrot Connecticut, QSL?" If they didn't get all of the exchange, they will ask for a repeat.

5) If you are running a pileup: Once you have pulled a call out of the pileup, give your exchange information first. Here's an example: "Whiskey-One-Alfa-Whiskey, copy 3F Connecticut, QSL?" Don't ask for the calling station's information first -- this will reduce any sense of rhythm and timing in the pileup.

6) If you get a pileup of stations and can't make out an entire call, listen for one letter and ask for it specifically: "The station with Delta only, go ahead."

7) When you get the other station's information, keep your acknowledgment simple. "QSL, thanks, QRZ Field Day from Whiskey-One-Alfa-Whiskey."

8) Find a comfortable pace for you and maintain that pace. You will tire quickly if you are screaming into the microphone or trying to work stations too quickly. This leads to inefficiency.

9) Use a headset with a boom microphone and a foot switch -- this frees up your hands to log QSOs. Writing or typing with a mike in your hand slows you down.

10) Go for as many bonus points as you possibly can. Numerous opportunities exist, from copying the Field Day message to sending traffic to using natural power for QSOs.

These tips should help maximize your score on Field Day. Remember: No matter how you choose to enjoy Field Day, maximize your fun, however you define it.

Field Day… For the Fun of It!

We all became hams for our own reasons. Some of us were interested in public service and helping others in times of need. Many discovered the hobby as an outlet to their curiosity about electronics and communications. Still others joined our ranks because of the quest to meet new people and expand their own personal bank of knowledge.

Whatever the reason you became an amateur, there is one compelling thread that brought us all together in this fraternity of amateur radio. It is as simple as can be:

We became hams for the FUN of the hobby!

And while it serves a wide array of interests and purposes, there is no greater FUN-damental goal for Field Day than to **HAVE FUN**! While it encompasses a broad range of amateur radio interests – CW, Phone, Digital, emergency preparedness, public service, satellites, recruitment, antennas, new and vintage equipment, and so many more – Field Day is, above all else, a chance for us to have some fun with our hobby. After all, while it is a regulated service and there are serious aspects to our use of the bands, the true "amateur spirit" of our hobby (defined by Paul Segal, W9EEA, back in 1928 in ***"The Amateur's Code***") is found in "slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation and consideration for the interests of others."

Fun is where YOU find it in this hobby. Some will discover the fun by operating overnight building up their club's total number of **QSOs**. Others will never make a single Field Day contact but will derive their fun by helping set-up **antennas and generators.** The joy of sharing your radio **knowledge** to a newcomer will be fun for many old-timers while other old-timers will experience the "Field Day high" when they make their very first QSO using a new **digital mode** or via one of the amateur radio **satellites**. The camaraderie of the annual club Field Day **picnic** covered dish supper will be a fun highlight for many, while still others will find the joy in the hobby by simply being able to spend a couple of hours from home on an otherwise busy weekend tuning the bands and making a few contacts.

Now is the time to start preparing. There are no significant rule changes for Field Day 2009. So no matter how you choose to participate, let the planning and adventure begin. Try something new! Get newcomers involved! Test your skills and limits. But what ever you do, remember the first and most important element of Field Day is **HAVE SOME FUN!**

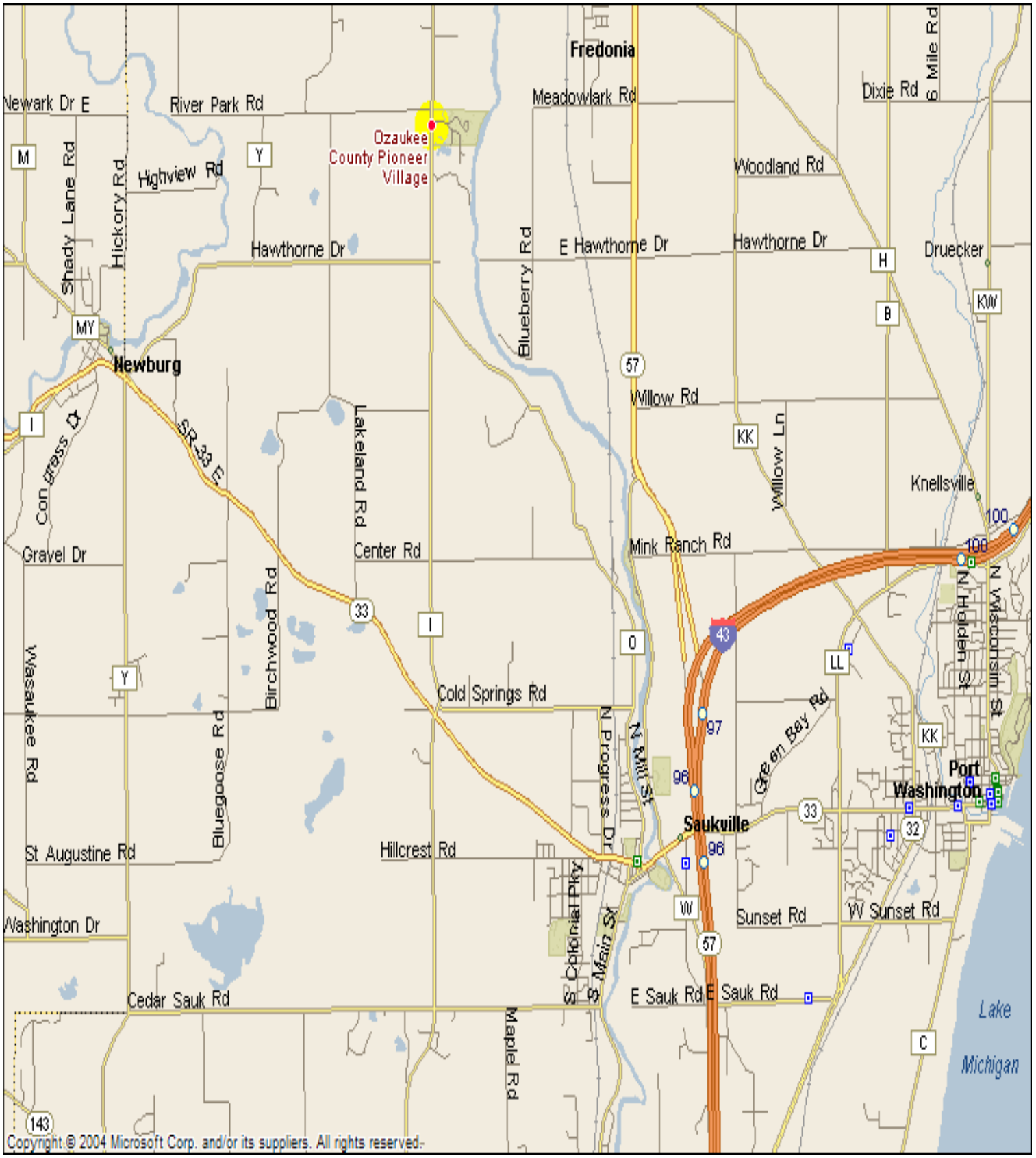
See you on the air June 27th and 28th. 73!

Dan Henderson, N1ND

ARRL Field Day Manager

fdinfo@arrl.org or (860) 594-0236

Our Club Field day sight at Pioneer Village in the Hawthorn County Park complex at Cedarburg. Operation times June 27th 1pm—June 28th 1pm. Setup Friday.



Next Regular Meeting

The next meeting will be June 25th at 7:00PM. We meet in the Fellowship Hall of Redemption Lutheran Church, 4057 N Mayfair Road. Use the south entrance.

Please do not call the church for information!

Club Nets & Breakfast

Please check in to our nets on Friday evenings.

Our ten meter SSB net is at **8:30 p.m.** at **28.490 MHz USB.**

Our two meter FM net follows at 9:00 p.m. on our repeater at **145.390 MHz** with a minus offset and a **PL of 127.3 Hz.**

Join us for Saturday morning breakfast at **Maxim's Restaurant, 18025 W. Capitol Dr.** We usually meet at around 8:00 a.m., and order around 8:15 a.m. The food and the company are good and

You don't have to be a member of the club to join us!

Club Repeater, 145.390– MHz (127.3 PL)

Visit our website at: **www.w9rh.org**

Or phone (414) 332-MRAC or 332 - 6722

Chatter Deadline

The **DEADLINE** for items to be published in the **Chatter** is the 7th of each month. If you have anything (announcements, stories, articles, photos, projects) for the 'Chatter, please get it to me before then.

You may contact me or Submit articles and materials by e-mail at: **Kc9cmt@earthlink.net**

or by Post at:

Michael B. Harris

807 Nicholson RD

South Milwaukee, WI 53172-1447

Experimenter's Bench

W8WWV - Building High Power, High Q, Loading Coils

Reprinted with permission, By: Greg Ordy

Introduction

These pages describe the loading coil (inductor) that was built for a center-loaded 160 meter (1.83 MHz) vertical antenna. I attempted to build a *high Q* coil in order to minimize losses in the coil. The unfortunate fact is that loading coils for 160 meter vertical antennas will almost always have enough loss to dissipate a significant percentage of the total power delivered to the antenna. This means that if you intend to operate at high power levels, the loading coil must be capable of dissipating it's share of that power.

Background and References

An antenna is *resonant* on some frequency when it has only radiation resistance, and zero reactance. A vertical antenna becomes resonant when it is approximately 1/4 wavelength long. Several factors influence the exact length needed for resonance, particularly the diameter of the antenna relative to the length. A *fatter* antenna does not need to be as long as a *thinner* antenna. To be a little more precise, the vertical will be resonant (zero reactance) when it is 90 electrical degrees long. The relationship between electrical length and physical length is complex, and depends upon many factors.

Let's assume that you have a resonant 1/4 wavelength vertical antenna. What happens if you start to vary it's length? Whether you make the antenna shorter or longer, it will begin to exhibit reactance at what was the original resonant frequency. If you shorten the antenna, it will develop capacitive reactance, which is measured in negative Ohms. If you lengthen the antenna beyond it's resonant length, it will develop inductive reactance. Inductive reactance is measured in positive Ohms.

There is nothing inherently wrong with using an antenna which is not physically resonant. The typical approach is to *cancel* the reactance with a capacitor or inductor that equals the antenna reactance, but is of the opposite sign. When the antenna develops capacitive reactance because it is made shorter, inductive reactance is added to cancel it. When the antenna is longer than its resonant length, it becomes inductive, so a capacitor is used to cancel the inductive reactance.

Please note that these are general statements subject to many factors. For example, I have not indicated where to place the canceling reactance in the physical antenna. In practice, there are many choices.

A very thin wire approximately 134 feet long is equal to 90 electrical degrees at 1.83 MHz, which is near the middle of the DX portion of the 160 meter amateur radio band (in the United States). If we could stand a 134 foot long wire straight up on its end, we would have a resonant antenna for that frequency. As you might imagine, thin wires won't stand up on end, but boy, do I wish they would. So much of antenna work would be made simpler if that worked. If we build the antenna out of a structure that can be made that tall, such as a triangular antenna tower, the good news is that the length needed for resonance will decrease, but you still have a something usually over 120 feet tall.

Since achieving this length is often expensive in materials, substantial in ground space needed to install and guy it, and possibly an eyesore to those who don't see beauty in antennas, many 160 meter vertical antennas are physically shorter, and are not naturally resonant. That means that they will exhibit capacitive reactance, and will need an inductor to bring the antenna system into resonance. Much research has gone into determining how to make a vertical antenna *efficient*, especially those that are inductively loaded because they are physically shorter than their natural resonant length. Some of my favorite vertical antenna references include:

The pages of L.B. Cebik, W4RNL. He has an excellent series of pages on the alternatives in loading a half-height 80 meter vertical. Efficiency improves as the loading coil is placed further and further away from the base of the antenna. In other words, center loading is better than base loading, and top loading is better than center loading, and if you have to load a short vertical at all, use a *capacity hat*. W4RNL uses extensive modeling to verify these results which have been presented in many sources over many years.

ON4UN's Low-Band DXing, third edition. The chapter on vertical antennas covers all aspects of these antennas. Much information is given on the relative merits of loading techniques. The conclusions follow the W4RNL pages, but the information presentation and writing style differ, as one would expect with different authors.

The *ARRL Antenna Book*. The best information on loading short verticals in contained in the chapter on mobile antennas.

Loading Coils for 160-Meter Antennas, Charles Michaels, W7XC, QST magazine, April, 1990. A detailed look at how one can relatively optimize the Q of a loading coil.

Vertical Antennas, William Orr, W6SAI and Stuart Cowan, W2LX. A good source of general information on verticals, with practical designs.

Vertical Antenna Handbook, Capt. Paul Lee, N6PL. Another good source of general information on verticals, with practical designs.

Vertical Antenna Classics, ARRL Publications. A collection of reprints from ARRL publications, on many aspects of vertical antennas.

Reflections II, M. Walter Maxwell, W2DU, published by Worldradio Books. Available from CQ's Worldradio's website. Also available through the ARRL. While this excellent work covers far more than loading coils, the importance of high Q loading coils comes up in several places. In particular, page 6-14 discusses the relationship between turn spacing and self-resonant frequency.

Without restating all of the excellent material in those sources, let me try to motivate the need for high Q and high power loading coils.

Regardless of the location of the inductor in the antenna (base loading, center loading, top loading, etc.), it is quite common to require at least several hundred Ohms of inductive reactance to cancel the capacitive reactance of the shortened antenna (on 160 meters). The Q of the inductor is defined to be the reactance of the inductor divided by the resistance. The Q value of a good, but not optimum, inductor might be approximately 250. If the reactance of the inductor is 750 Ohms, the resistance is equal to (750 Ohms / 250), which equals 3 Ohms. While 3 Ohms may not sound like a lot of resistance, we have to put that value into the context of the whole antenna.

Although there are many factors that control the efficiency of the antenna system, major factors include the radiation resistance of the antenna, loss in the ground radial system, and loss in any loading components used to bring the antenna into resonance. Each of these terms is measured in Ohms. A 160 meter antenna shortened to a little less than one half of its resonant length (still a tall structure) might have a radiation resistance of 15 Ohms. A ground radial system consisting of approximately 32 wires, each 0.3 wavelength long (quite a lot of wire), over *good* soil might have a loss resistance of 10 Ohms. In addition, we have 3 Ohms of loss resistance in the example inductor.

We can get a good approximation of the efficiency of this antenna by using the formula: *Efficiency = Radiation Resistance / Total Radiation and Loss Resistance*. In this case, we have 15 Ohms divided by 28 (10 + 15 + 3) Ohms, or 54 percent. So, in this example, about half of the power we send to the antenna is radiated, and the other half is wasted, heating the ground and the loading coil. The loading coil represents 3 Ohms of the total radiation and loss resistance of 28 Ohms. This is a little more than 10 percent of the total resistance. If we decided to pump 1500 watts into this system, approximately 150 watts will be dissipated in the loading

Now let me stop for a second and mention that I am painting with a very broad brush. There are many factors which tilt the computations in one way or another, in particular, the location of the loading coil in the antenna. Please read the sources listed earlier for all of the details. Still, these numbers are not atypical. In some cases, the power dissipated in the loading coil could go up to several hundred watts. This is easy to do if the radiation resistance or ground resistance goes down, causing the loading coil to take on a larger percentage of the total resistance. The radiation resistance will go down if you make the antenna shorter, which is a natural temptation, and the ground resistance will go down if you add more radials, which is usually all that can be easily done to increase the efficiency of an existing antenna. In other words, if you improve your ground radial system, you will actually increase the power dissipated in the loading coil since it the power saved in the improved ground system will be redistributed between the radiation resistance and the loss in the loading coil. Sad, perhaps, but true.

If we can increase the Q of the loading coil to an optimized value of 800, we will reduce the loss in the coil by over two thirds. The down side to using a higher Q coil is that the bandwidth of the antenna will be reduced, but fortunately on 160 meters the needed bandwidth in the DX window is small (if you are interested in operating in more than the DX window, the reduction in bandwidth can become an important consideration).

The bottom line for me is that in typical situations, a loading coil which is part of a shortened 160 meter vertical antenna will be called upon to dissipate up to several hundred watts, assuming an input power of 1500 watts. We need to make sure that the coil can handle this power without failing. If we can improve the Q from typical values of 200 to 300 up to more optimum values of 800, we can reduce the loss in the coil by the Q improvement ratio, reducing the power handling requirements of the inductor, and providing more power for desired signal radiation.

Building High Q and High Power Inductors

A number of factors influence the Q and power handling capacity of an inductor. The Q is highly influenced by the relative physical dimensions of the coil. Long coils with small diameters should be avoided. An important metric is the *length to diameter* ratio. As the name implies, the length of the total coil is divided by the diameter of a single turn on the coil. In order to maximize Q, the length to diameter ratio should be in the range of 0.5 to 2. A coil with a length to diameter ratio of 1 is as long as it is wide. If one were to look at the coil from the side, the cylindrical shape maps into a square. For this reason, a coil with a length to diameter ratio of 1 is also called a *square coil*. There are no 90 degree angles in the coil, but rather the coil is as wide as it is tall - that's the square being referenced. In general, a smaller length to diameter ratio improves Q. It is also desirable to space the turns by approximately the thickness of the wire used.

Closely-spaced inductors will maximize the *distributed capacitance* that exists between every turn. The net effect of this phenomena is the same as if a capacitor was placed across the inductor, created a resonant tank or trap circuit. As we all know, a parallel resonant circuit greatly resists the flow of power through it (at the resonant frequency). The high resistance (impedance) at resonance will decrease on each side of resonance, both towards higher and lower frequencies. It is desirable, therefore, to operate the inductor as far away from it's self-resonant frequency as possible. A closely-spaced inductor, with the largest distributed capacitance, will tend to have a lower self-resonant frequency (than if the turns were spaced further apart). The lower self-resonant frequency may cause the impedance through the coil to rise at the operating frequency, which is exactly the opposite of what we desired.

The power handling capacity of an inductor can be increased by building it from thicker wire. At short-wave frequencies, a phenomena named *skin effect* forces all current to flow into the outside layer of metal. As a result, a wire tube will be as effective as the same diameter of solid wire. For all practical purposes, copper is as good as more expensive materials such as silver and gold, and is somewhat better than aluminum. Copper, however, can be more easily oxidized than aluminum. Since the impact of *skin effect* is that the current will flow on the outside of the conductor, copper should be protected from oxidation by a spray coating such as clear *Krylon* acrylic spray paint.

The last major factor influencing inductor Q is the form used to support the turns. Ideally, air should be used, but air provides no mechanical support. Forms of plastic pipe are popular because pipe is locally available, inexpensive, and supplied in a wide range of diameters. The concern with any form is its absorption of energy at the operating frequency. One of the classic tests to determine if a material is suitable for use as a coil form is to place a small length of it in a microwave oven with a glass of water. If after a minute or two of power the material is still cool (but the water may be boiling), it is probably an acceptable coil form.

In my case, I decided to use 5/16 inch copper tubing as the coil wire. This material is available in useful lengths such as 50 feet, and can be found at most hardware stores. If this tubing were given a wire gauge, it would be very close to #1 gauge. #1 gauge wire should easily carry thousands and thousands of watts without failure. This particular coil requires approximately 56 feet of tubing, so be sure to estimate your needs before making a purchase.

One of the desirable properties of the copper tubing is that it can be easily bent, and tends to hold its bent shape. This property made it possible for me to dispense with a solid cylindrical form, and instead use six *spacer arms*, equally positioned around the coil.

My nearby large city, Cleveland, has a well-stocked specialty plastic shop that sells exotic materials, as well as fabricates parts for a wide range of applications. The extras, ends, and experiments, end up in an outlet store. I was able to pick up long plastic bar stock which I believe is *Lexan*, an extremely strong plastic. The stock is approximately 1 inch wide, and 1/4 inch thick. I cut a number of 13 inch lengths. Using a drill press and a sharp drill bit, I drilled holes along the center line of the bar stock, spaced at a little less than twice the diameter of the copper tubing. A drilled length of the bar stock is shown in the following picture, along with some of the copper tubing.

The copper tubing comes coiled in a box, and the material shown in the picture was excess tubing. The out-of-the-box shape of the tubing is an important part of using it in this design. The tubing already is formed into rings, and it is relatively easy to adjust the radius.

Construction Details

Here are several views of the completed coil.

The left picture shows the coil next to an MFJ antenna analyzer. One of the six plastic spacer arms was cut from a larger piece of plastic. This provided a place to mount the coil on the side of the wooden mast which is the bottom section of my vertical. I use approximately 38 feet of wooden mast topped off with 35 feet of aluminum tubing. The coil is at the electrical and mechanical interface between the two sections.

Winding the coil is a tedious process of threading the tubing through all of the holes on all six spreader arms. The radius of the coil is set in the first complete turn or two. The coil has a length to diameter ratio of approximately 1.53 to 1. This is less than the largest suggested value for creating a maximized Q value. I experimented with making the coil even larger in diameter, but found that it was too flexible, and tended to sag at the far (outside) edge of the coil. The 13 inch long coil, approximately 8.5 inches in diameter, supports itself quite well. While this was the only coil that I built using this technique, I did build a simplified prototype to help me determine the length of the coil I would need to resonate my particular antenna.

When winding the coil through the spreader arms, the arms are periodically shifted around the coil to facilitate the threading operation. Once the coil was completely wound, the spreader arms were adjusted to be equidistant around the perimeter of the coil. I used cable ties on each side of the arms to lock the turns in position. When complete, I sprayed the coil with a number of coats of clear *Krylon* acrylic paint, in an attempt to slow down the oxidation process.

This picture shows the coil mounted on the 160 meter vertical. It has been in the air for approximately 5 years. Since the plastic is exposed to wide ranges of temperature and ultraviolet light, it should be of a type that does not break down under such stress.

After I had the coil up on the antenna, I started to acquire some test equipment that would let me directly measure the resistance and

reactance of the coil. Since lowering the antenna is a nontrivial job, I won't be making any measurements until I take the whole antenna down and replace it with a full-size, nonloaded, vertical. I don't know if I have achieved that supposed outstanding Q of 800, but I would like to believe that I am at least at 600. My ground radial system consists of approximately 60 radials, each between 60 and 90 feet long. This is on top of rich Midwest soil, over my septic tank leech field. I would hope that my ground losses are relatively low. This puts more demands on the loading coil, since it supplies more of the overall resistance in the system. With 1500 watts from my amplifier driving the antenna, I have always been able to work everything that I can hear. In fact, as is often the case on 160 meters, I spend far more time working on receiving antennas than my vertical, which I only use for transmitting.

From the ARRL Weekly Bulletin

Amateur Radio and Pecuniary Interests

A topic that keeps popping up, Cross said, is business use of Amateur Radio, specifically transmitting messages on behalf of an employer. "Section 97.113 <http://edocket.access.gpo.gov/cfr_2002/octqtr/pdf/47cfr97.113.pdf> answers this question straight on: 'No amateur station shall transmit communications for hire or for material compensation, direct or indirect, paid or promised, except as otherwise provided in these rules.' There are two exceptions. There are exceptions for teachers who are using Amateur Radio as the control operator of a station in an educational institution as part of a classroom thing and control operators of club stations in certain cases. A station is also not allowed to transmit communication in which the station licensee or control operator has a pecuniary interest, including communications on behalf of an employer. There is an exception to that rule that allows you to transmit communications that are commonly referred to as "swap nets," but eBay seems to have reduced the need for these nets. And you're not allowed to transmit communications on a regular basis which could reasonably be furnished through other radio services."

Cross said that Section 97.113 is in the rules for two reasons: It meets a statutory requirement and it is there to protect your frequencies from becoming the business radio alternative voice overflow, or "'BRAVO Service.' Because your spectrum is so valuable, if you let users such as businesses, TV stations, the National Weather Service or other users -- be they for-profit or non-profit -- use your frequencies to meet their communications needs, your frequencies will become their frequencies. All it takes is an allocation proceeding with the FCC, and your spectrum is gone. And you will be left whining about it in Internet chat rooms."

Cross pointed out the ARRL Chief Executive Officer David Sumner, K1ZZ, "had an editorial on this on April 1, 2009 [on the ARRL Web site and in the April 2009 edition of QST] ["It Seems to Us: Keeping the 'Amateur' in Amateur Radio," page 9]. That's probably not the best day to date something, but you should read it. And I have plagiarized from that greatly because it is very elegant and spot on" <http://www.arrl.org/news/features/2009/04/01/10668/>.

The bottom line, Cross said, is "that when any of us are on the air as amateurs in the ham bands, we are not pursuing financial gain for ourselves or our employers. The 'no pecuniary principle' has been reflected in the FCC regulations since 1928. It distinguishes us from commercial services. In 1993, the Commission, at your request, dropped the 'no business communications' language and simply prohibited communications on behalf of an amateur's employer or in which the amateur has a pecuniary interest. The Commission stated that any amateur-to-amateur communications is `for the station control operator or his or her employer.`"

Cross said that it does not matter what type of technology -- be it SSB, digital, slow scan TV or CW -- is used to transmit that communications: "It boils down to a simple four part test that you, as the control operator of the station, must ask yourself before you cause the station to transmit a message. One, is the communications expressly prohibited in the rules? For instance, is it music, is it obscenity, something like that. Two, is the communications transmitted for compensation? Whether it's paid or compensation in some other way, such as, 'If you get this message to a friend of mine who's on a sailboat in the middle of nowhere, I'll pay your light bill.' Or, 'Get this message to someplace and I'll buy you a new radio.' That's indirect compensation. Three, does the control operator have a pecuniary interest in the communications? That is, could he or she benefit financially? Stock trades on ham radio benefit you financially. And four, does the control operator's employ er have an interest in the communications? If the answer to each of these questions is 'no,' then the communications is acceptable with the caveat that it is not on a regular basis, one which could be furnished alternatively through other radio services."

There are limits to what an amateur can do on behalf of his or her employer, Cross said, as well as limits to the extent that Amateur Radio can be used for the purpose for which other radio services were created. "'No communications on behalf of an employer' means just that," he said. "There's no exception for the 15 minutes you're on break. There's no exception for 'Gee, it's the weekend,' or there's no exception because you want to do it. If it's your employer, you cannot transmit communications on their behalf. That is a commercial communications."

Public Service Communications

"There's no rule about public service communications as such in Part 97, because most of the messages you transmit that you think of as public service communications are allowed by Section 97.111 **<http://edocket.access.gpo.gov/cfr_2002/octqtr/pdf/47cfr97.111.pdf>**. Paragraph (a) authorizes an amateur station to transmit two-way communications including, among other things, exchanging messages with other stations in the Amateur Service and communications necessary to meet essential communications needs and to facilitate relief actions." Cross noted that most of these transmissions -- the essential communications needs and facilitating relief actions -- are two-way exchanges with messages with other amateur stations. "The rule also authorizes you to transmit one-way communications, such as transmissions necessary to make adjustments to the station -- these are your tests, your tones, tossing the carrier to see what the SWR is, that sort of thing -- and brief transmissions necessary to establish two-way communications with other stations."

Cross said that the rules cover everything we do as Amateur Radio operators: "Ragchewing, DX, contests, DXpeditions, county hunting, tuning up, everything. Ninety-nine percent of our communications fall under the rules that are there."

Emergency communications, by their nature, involve an element of immediacy, immediate safety of property and life. "Reporting where damage is, what happened after a tornado goes through or where power lines are down, is certainly public service communications and

ARRL Newsline Article Continued:

it's allowed under 97.111, but it may not involve an immediate safety of life and property," Cross explained. "A bridge washed out, for example, may need a more immediate response than downed trees, and reporting that is already allowed as just two-way communications between stations. A car with occupants floating down a river is clearly an emergency situation. In cases like that, the rules already provide that at all times and on all frequencies, each control operator must give priority to stations providing emergency communications. I have never heard of a case where a ham station has come on a repeater or a frequency and said, 'I have an emergency message,' and someone said, 'Wait your turn.' That's not your style ."

Testing & Local SwapFests

VE Testing

Saturday, July 25th

AES - 9:30AM

Amateur Electronic Supply 5720 W. Good Hope Rd. Milwaukee, WI 53223

Local Swapfests

August 15th

Racine Megacycle Free fest 2009Racine Megacycle Club Fireman's Park

http://www.w9udu.org

Talk-In: 147.270MHz + offset (PL None)

September 12th

ORC Fall Ham & Hobby Swapfest

Ozaukee Radio Club

Fireman's Park

http://www.ozaukeeradioclu.org

Talk-In: 146.970MHz - offset (PL 127.3)

Working Committees

Field Day

- Mark - AB9CD

FM Simplex Contest

- Sherm – KB9Q
- Joe – N9UX
- Jeff – K9VS
- Brian— K9LCQ

Ticket drum and drawing

- Tom – N9UFJ
- Jackie – No Call

Newsletter Editor

- Michael-KC9CMT

Webmaster

- Open

Refreshments

- Michael – KC9CMT

Membership Information

The Hamateur Chatter is the newsletter of MRAC (Milwaukee Radio Amateurs' Club), a not for profit organization for the advancement of amateur radio and the maintenance of fraternalism and a high standard of conduct. MRAC Membership dues are $17.00 per year and run on a calendar year starting January 1st. MRAC general membership meetings are normally held at 7:00PM the last Thursday of the month except for November when Thanksgiving falls on the last Thursday when the meeting moves forward 1 week to the 3rd Thursday and December, when the Christmas dinner takes the place of a regular meeting. Club Contact Information Our website address http://www.w9rh.org

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Address correspondence to:

MRAC

PO Box 070695,

Milwaukee WI 53207-0695.

Email may be sent to

w9rh@arrl.net

Our YAHOO newsgroup:

http://groups.yahoo.com/group/MRAC-W9RH/

CLUB NETS:

• Our Six Meter SSB net is Thursday at 8:00PM on 50.160 MHz USB

• Our Ten Meter SSB net is Friday at 8:00PM on 28.490 MHz ± 5 KHz USB.

• Our Two Meter FM net follows at 9:00PM on our repeater at 145.390MHz - offset (PL 127.3)

Milwaukee Area Nets

Mon.8:00 PM 3.994 Tech Net

Mon.8:00 PM 146.865- ARES Walworth ARRL News Line

Mon.8:00 PM 146.445 Emergency Net

Mon.8:00 PM 146.865- ARES Net Walworth

Mon.8:45 PM 146.670- ARRL voice news (ARES)

Mon.9:00 PM 50.160 6 mtr .SSB NET

Mon.9:00 PM 146.670- ARES Net Waukesha-Milwaukee

Tue.9:00 AM 50.160 6 . Mtr 2nd Shifter's Net

Tue. 9:00 PM 145.130 Handshakers National Net

Tue. 8:00 PM 7.035 A.F.A.R. (CW)

Wed. 8:00 PM 145.130 MAARS Amateur Radio Newsline

Wed. 9:00 PM 145.130 MAARS IRLP SwapNet

Thur. 9:00 PM 50.160, 6 mtr SSB Net

Thur. 9:00 PM 146.910 Computer Net

Fri. 8:30 PM 28.490 MRAC W9RH 10 mtr Net SSB

Fri. 9:00 PM 145.390 W9RH 2 mtr. FM Net

Sat. 9:00 PM 146.910 Saturday Night Fun Net

Sun 8:30 AM 3.985 QCWA (Chapter. 55) SSB Net

Sun 9:00 AM 145.565 X-Country Simplex Group

Sun.10:00 AM 443.800+ FM-38 link to 146.88 Baraboo SWAP Net

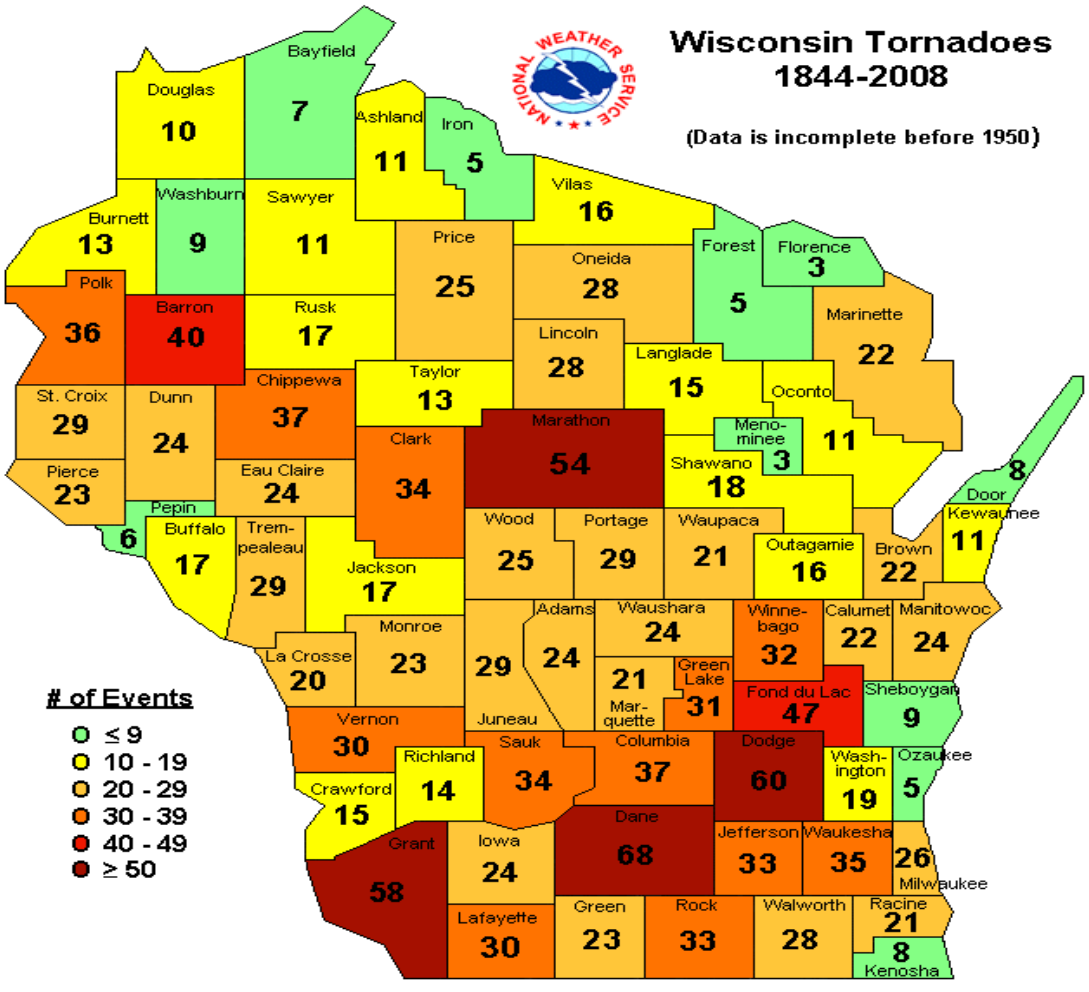
Sun 9:00 PM 146.910 Swap Net

Sun 8:00 PM 146.910 Information Net

Sun.8:00 PM 28.365 10/10 International (Milwaukee Ch.) (SSB)

2 meter repeaters are offset by 600KHz - - 70 centimeter repeaters are offset by 5 MHz

SSB frequencies below 20 meters are LSB and for 20 mtrs and above are US



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Member Information